



Madden-Julian Oscillation: **Recent Evolution, Current** **Status and Forecasts**

Update prepared by
Climate Prediction Center / NCEP
June 5, 2006



Outline

- **Overview**
- **Recent Evolution and Current Conditions**
- **Madden Julian Oscillation Forecast**
- **Summary**



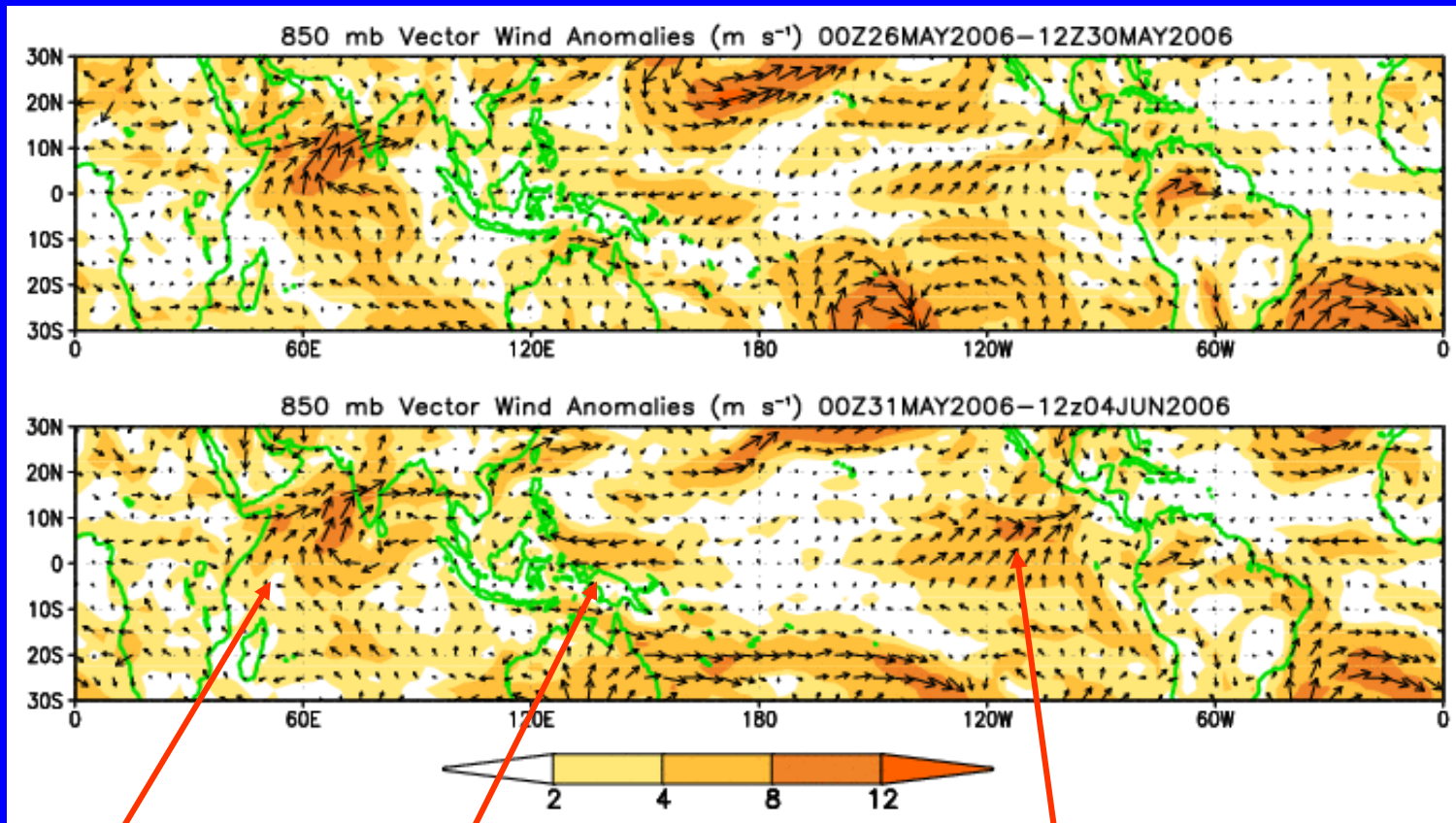
Overview

- The latest observations indicate a continued weak MJO.
- Based on the latest observations and model forecasts, the MJO is expected to remain weak during the next 1-2 weeks.
- Potential hazards during week 1 include an increased chance of above normal rainfall from the Bay of Bengal into the far western Pacific Ocean as well as the east Pacific Ocean, southern Mexico, Central America and northern South America. Conditions are favorable for tropical cyclone activity in the east Pacific Ocean and Bay of Campeche (most likely late week 1). Areas in the western Pacific Ocean, however, will benefit from the continuation of unfavorable conditions for tropical cyclone activity.
- Due to the highly uncertain pattern, no definitive statements for hazards/benefits during week 2 can be made at this time. There are some indications, however, that enhanced rainfall may again develop in the eastern Indian Ocean and sections of Indonesia by the end of week 2.



850-hPa Vector Wind Anomalies (m s^{-1})

Note that shading denotes the magnitude of the anomalous wind vectors



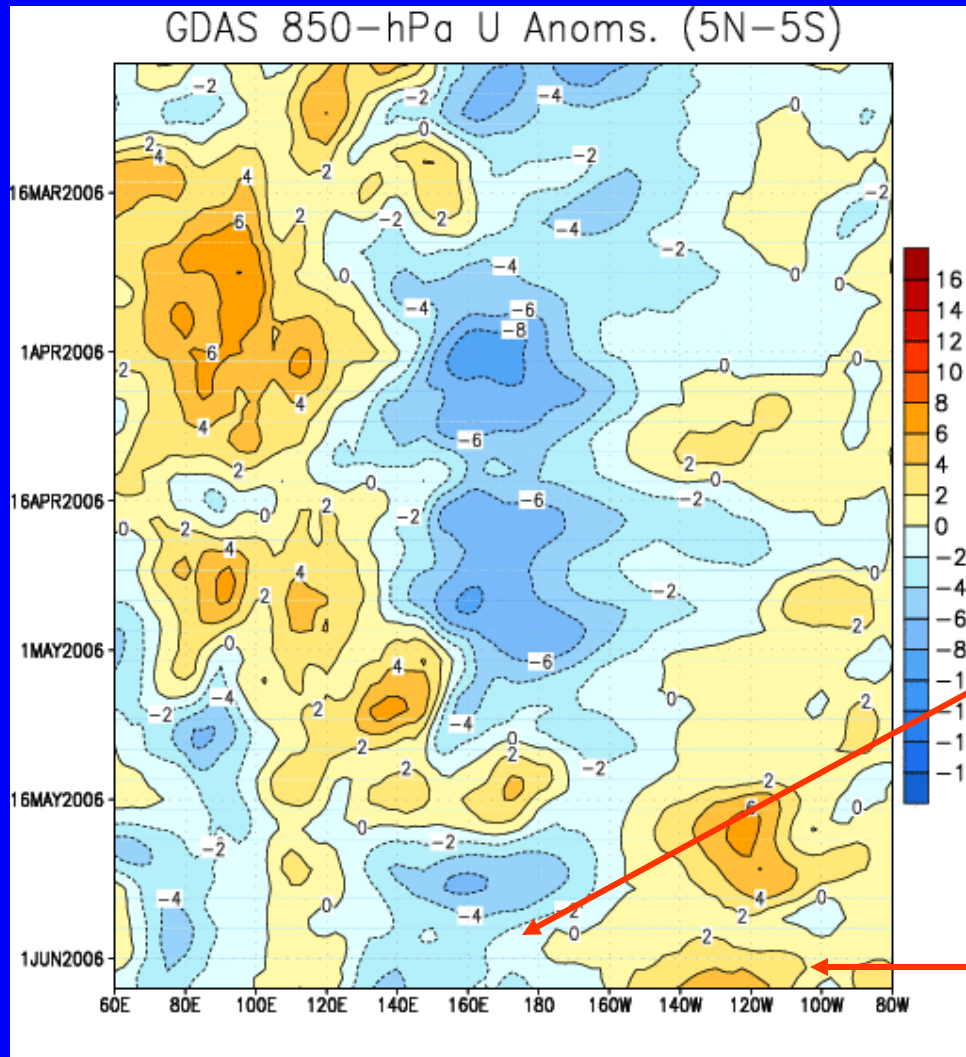
An enhanced Somali jet indicative of early onset to the Indian Monsoon.

Equatorial easterly anomalies weakened in the western Pacific during the last five days.

Southwesterly anomalies remain in the eastern Pacific.



Low-level (850-hPa) Zonal (east-west) Wind Anomalies (m s^{-1})



Weaker-than-average easterlies or westerlies (orange/red shading)

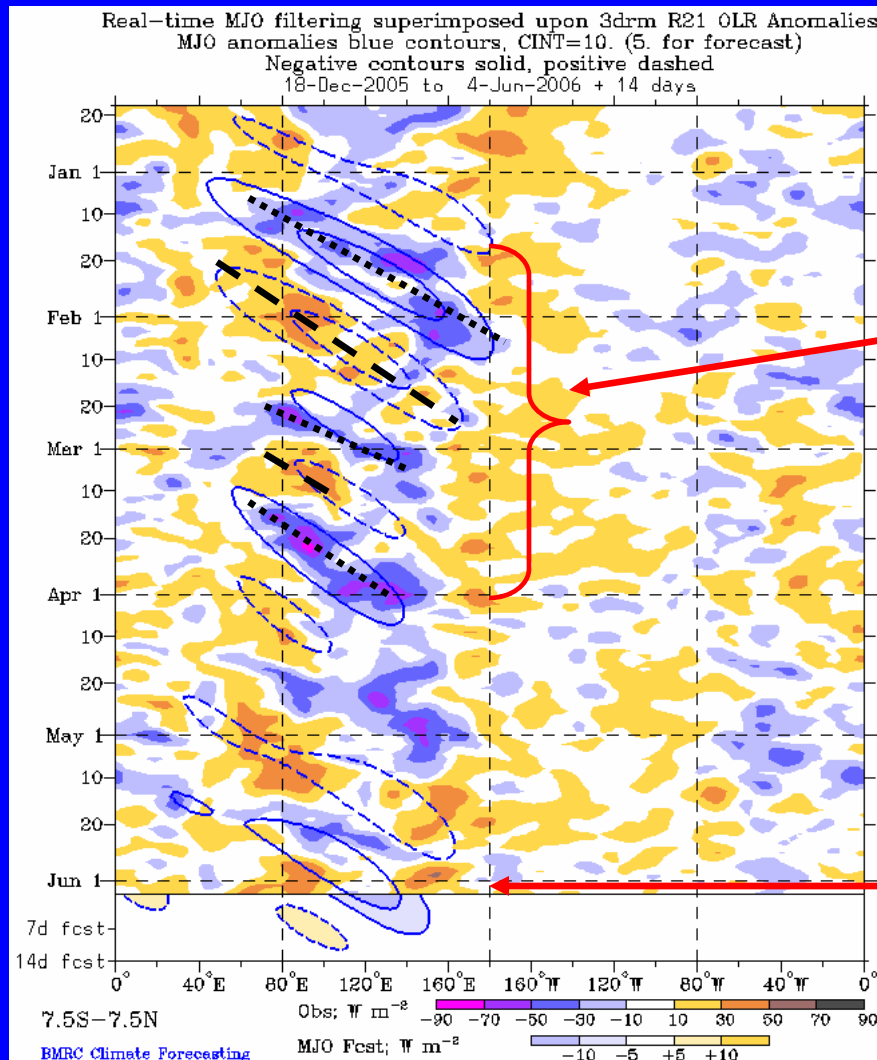
Stronger-than-average easterlies (blue shading)

Equatorial anomalies are generally near average across the Indian and western Pacific Oceans.

Westerly anomalies remain in the eastern Pacific Ocean.



Outgoing Longwave Radiation (OLR) Anomalies (7.5°S-7.5°N)



Drier-than-average conditions (/red shading)
Wetter-than-average conditions (blue shading)

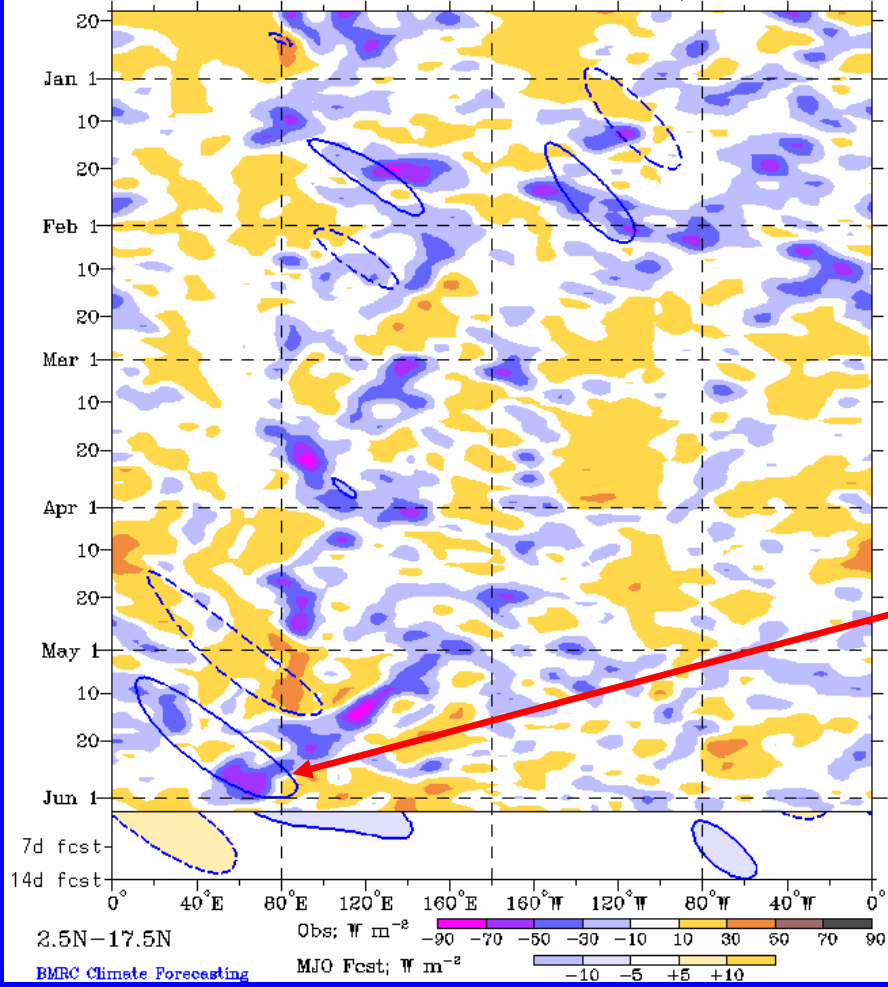
Eastward propagation of OLR anomalies associated with the MJO was evident from mid-January into March.

Convection has been suppressed during the past week across much of the Indian Ocean, Indonesia, and the western Pacific Ocean



Outgoing Longwave Radiation (OLR) Anomalies (2.5°N-17.5°N)

Real-time MJO filtering superimposed upon 3drn R21 OLR Anomalies
MJO anomalies blue contours, CINT=10. (5. for forecast)
Negative contours solid, positive dashed
18-Dec-2005 to 4-Jun-2006 + 14 days



Drier-than-average conditions (/red shading)
Wetter-than-average conditions (blue shading)

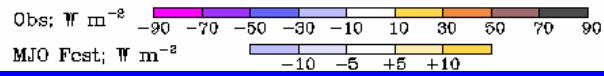
Strong enhanced convection in the Arabian Sea and sections of India in part associated with the monsoon circulation.

Time
↓

Longitude

2.5N-17.5N

BMRC Climate Forecasting

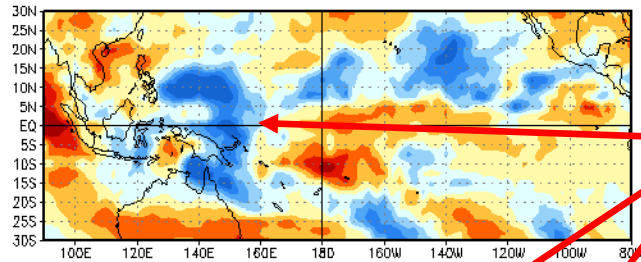




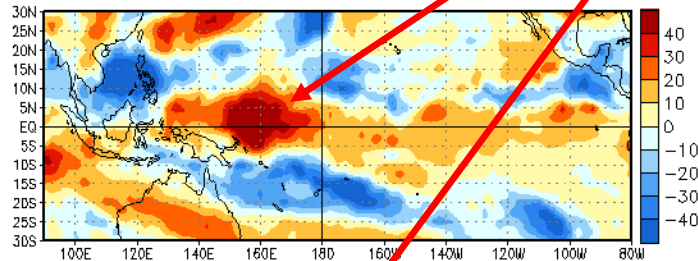
Anomalous OLR and 850-hPa Wind

Wind: Last 30 days

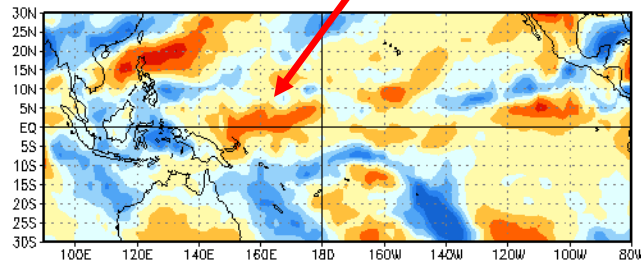
OLR Anomalies
1 MAY 2006 to 10 MAY 2006



11 MAY 2006 to 20 MAY 2006



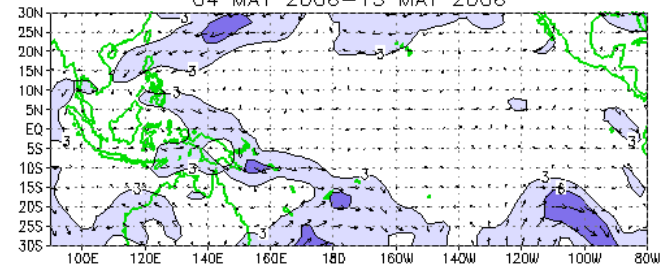
21 MAY 2006 to 30 MAY 2006



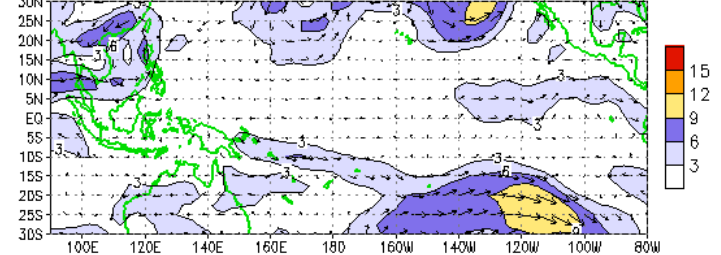
Wet conditions in the western Pacific Ocean have become drier than normal during May.

Westerly anomalies have developed in the eastern Pacific Ocean during the last ten days of May.

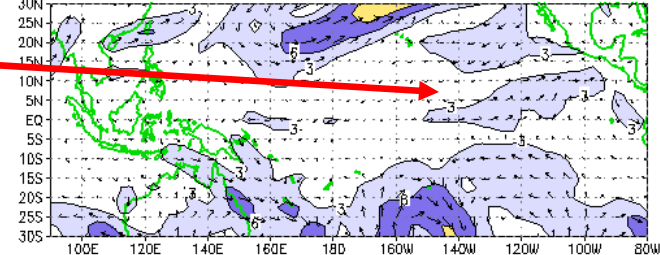
CDAS 850-hPa Wind Anoms
04 MAY 2006-13 MAY 2006



14 MAY 2006-23 MAY 2006



24 MAY 2006-02 JUN 2006

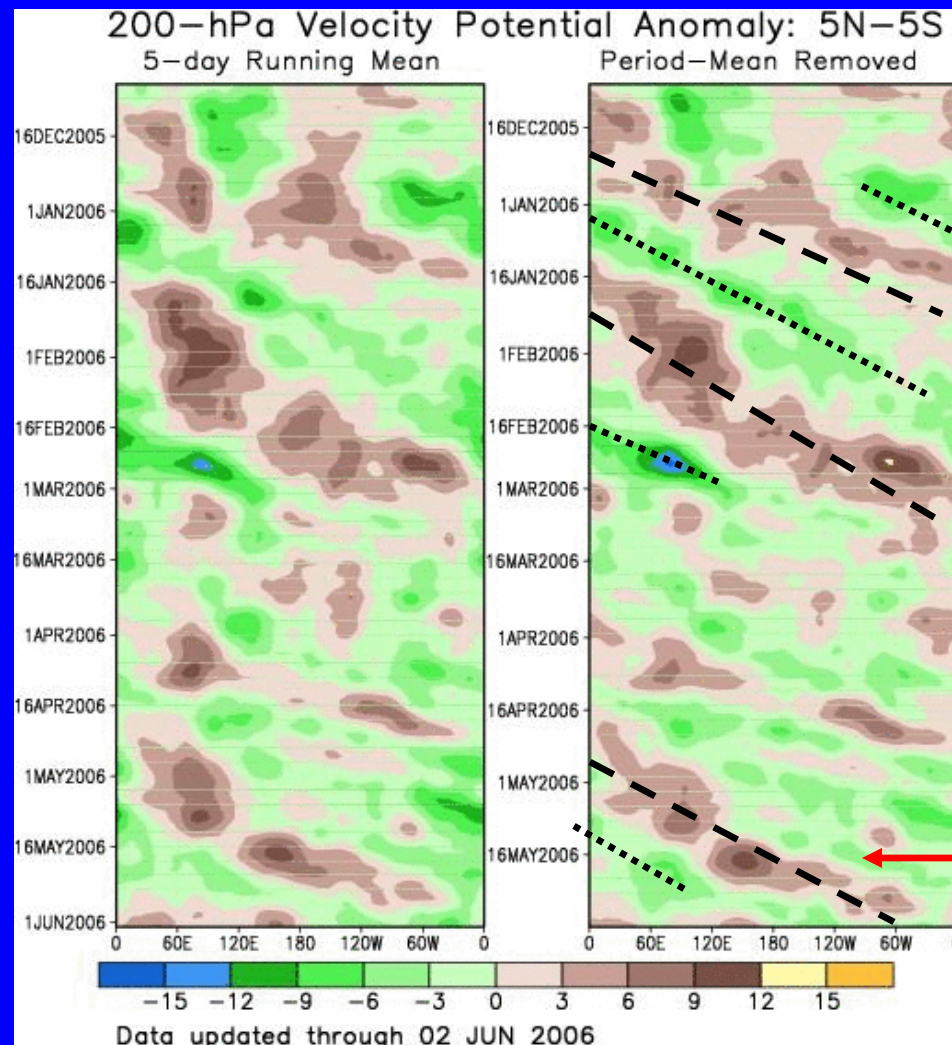




200-hPa Velocity Potential Anomalies (5°S-5°N)

Positive anomalies (brown shading) indicate unfavorable conditions for precipitation. Negative anomalies (green shading) indicate favorable conditions for precipitation.

Time



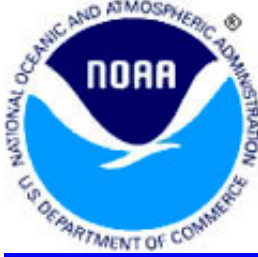
Weak to moderate MJO activity was observed during January and February.

The MJO was incoherent during much of March and April.

Some weak MJO activity was observed in early-mid May.

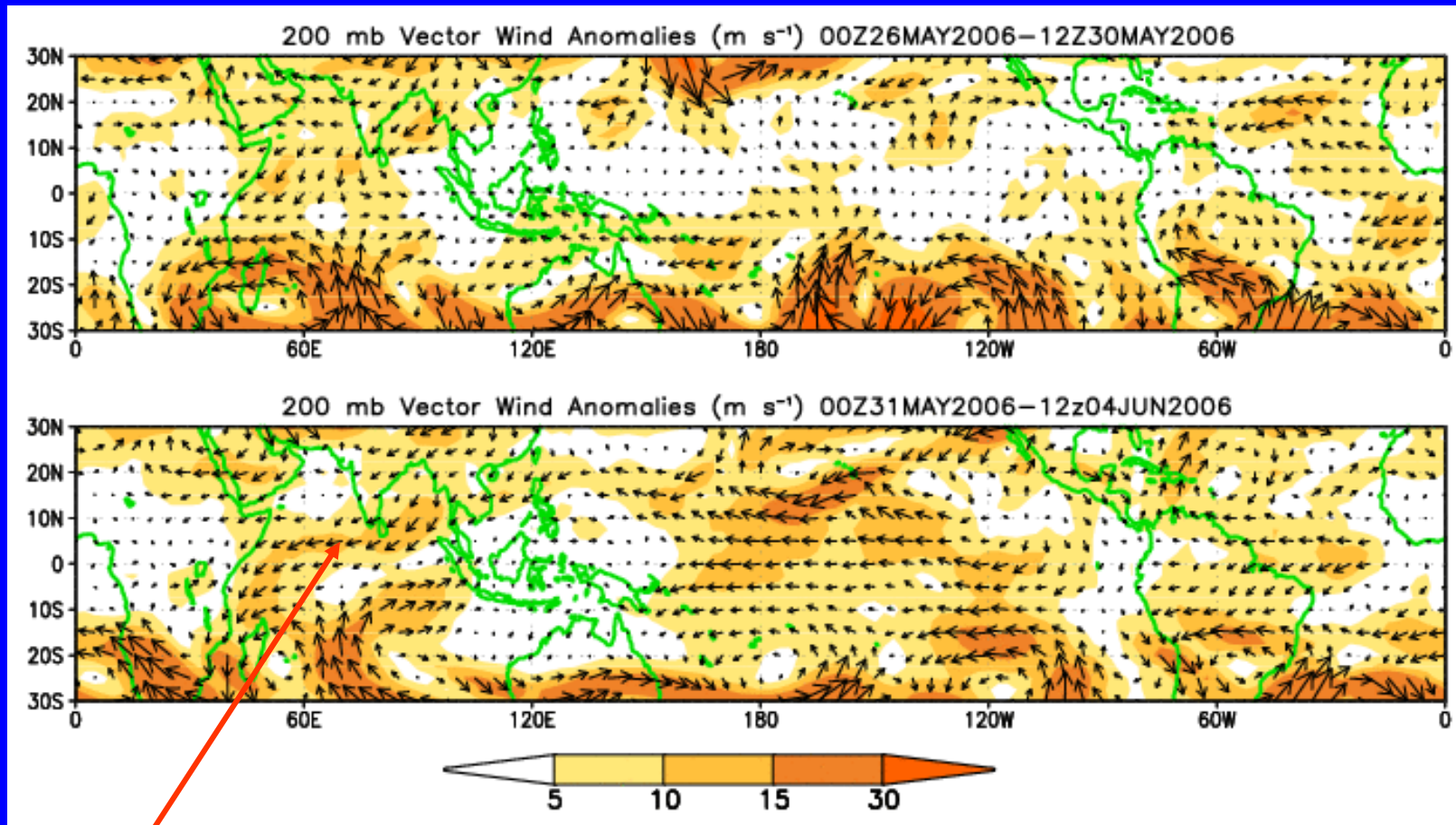
Longitude

Data updated through 02 JUN 2006



200-hPa Vector Winds and Anomalies (m s^{-1})

Note that shading denotes the magnitude of the anomalous wind vectors.

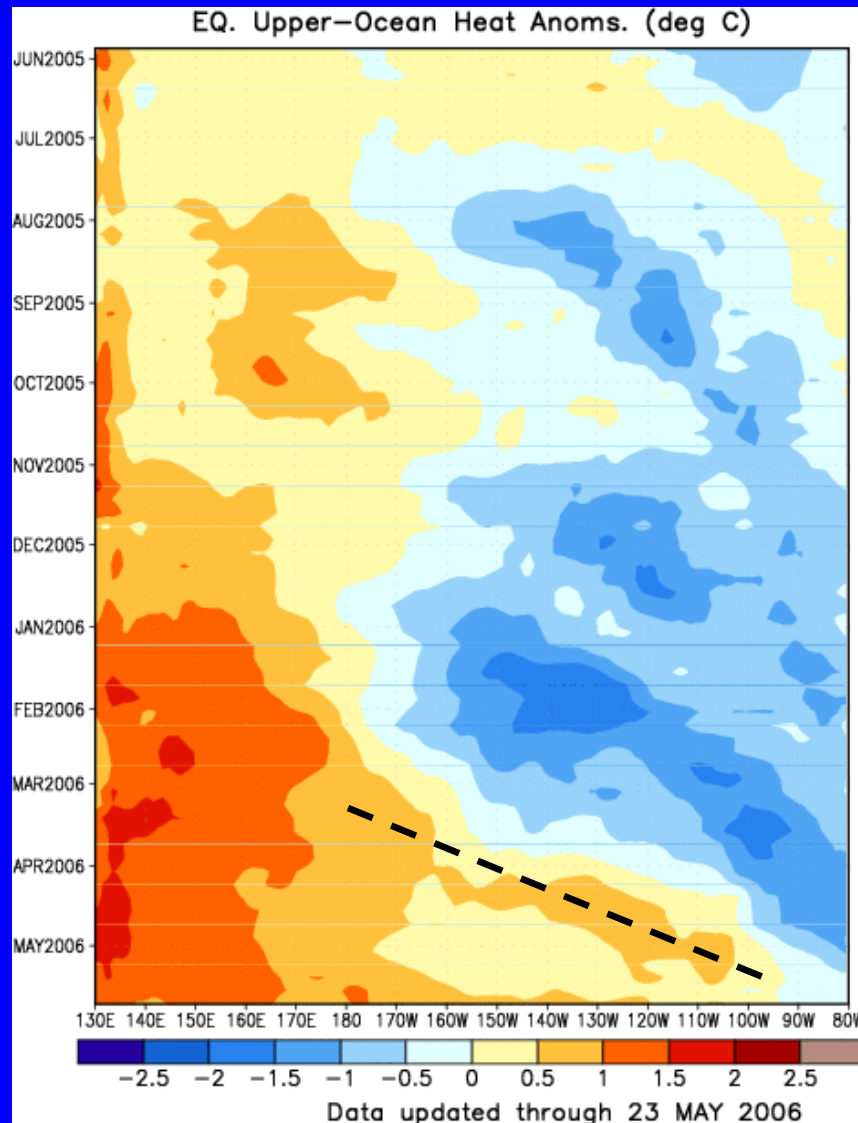


Anomalies in the Indian Ocean consistent with the early onset of the Indian monsoon.



Heat Content Evolution in the Eq. Pacific

Time



Longitude

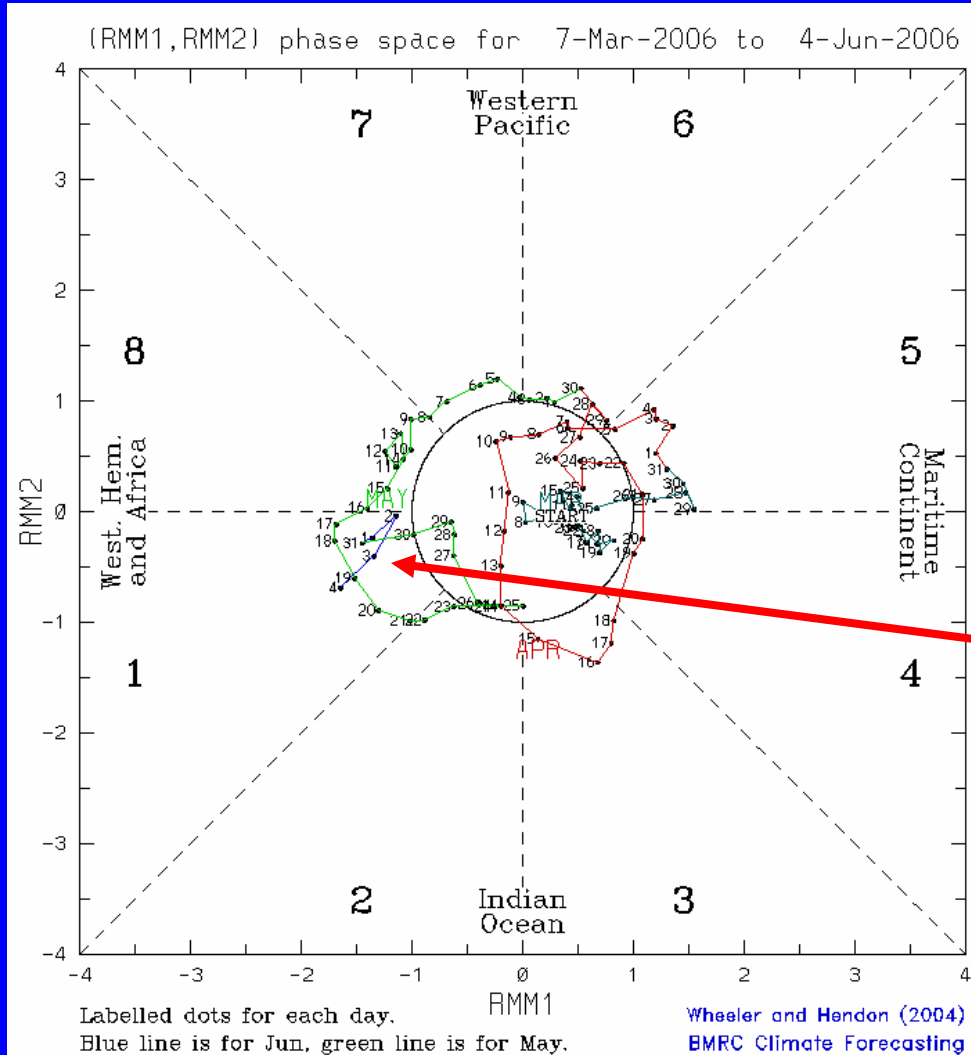
Above normal heat content expanded into the eastern Pacific during April and May 2006 associated with the Kelvin wave activity.



MJO Index (Magnitude and Phase)

The current state of the MJO as determined by an index based on Empirical Orthogonal Function (EOF) analysis using combined fields of near-equatorially-averaged 850 hPa zonal wind, 200 hPa zonal wind, and satellite-observed outgoing longwave radiation (OLR) (Wheeler and Hendon, 2004).

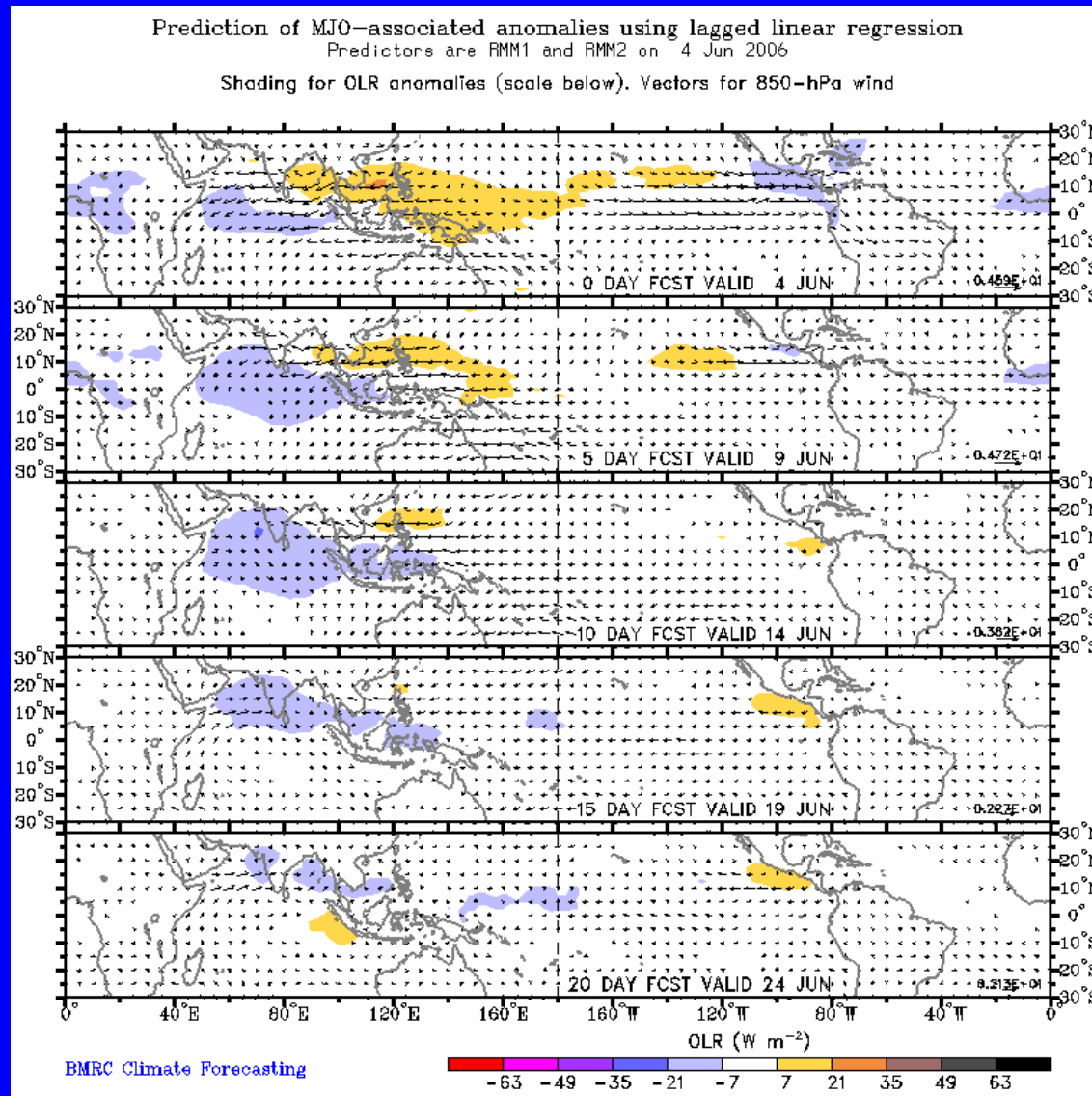
The axes represent the time series of the two leading modes of variability and are used to measure the amplitude while the triangular areas indicate the phase or location of the enhanced phase of the MJO. The farther away from the center of the circle the stronger the MJO. Different color lines indicate different months.



The amplitude of the MJO signal has strengthened during the last few days and remains centered in the Western Hemisphere.



Statistical OLR MJO Forecast

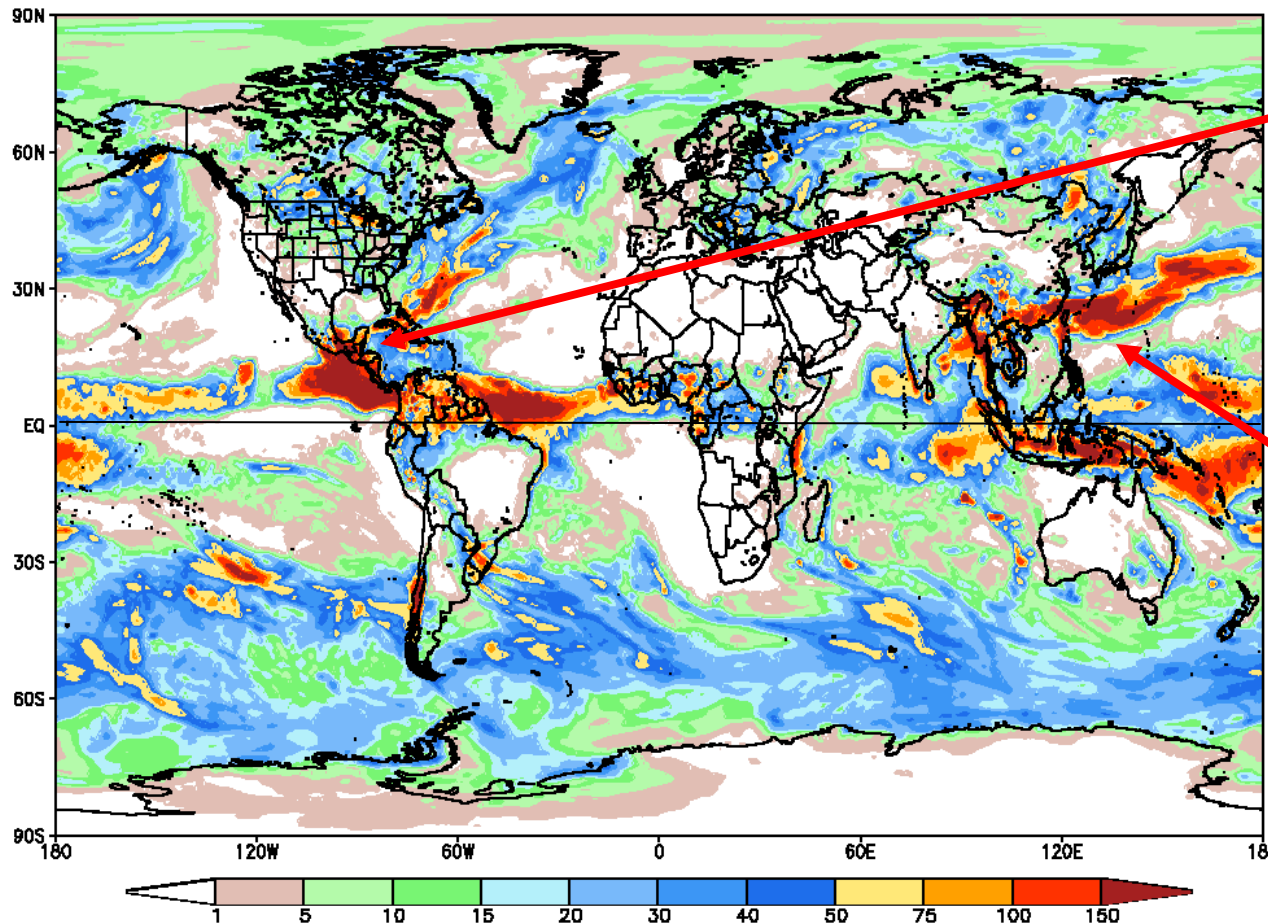


A statistical MJO forecast indicates enhanced (suppressed) convection in the Indian Ocean (western Pacific) during next ten days.



Global Forecast System (GFS) Week 1 Precipitation Forecast

GFS 37.5 km Week 1 Total Precipitation (mm)
Issued at Jun 05 2006 00Z for the period ending at Jun 12 2006 00Z



Abundant rainfall expected across sections of the eastern Pacific Ocean and southern Mexico.

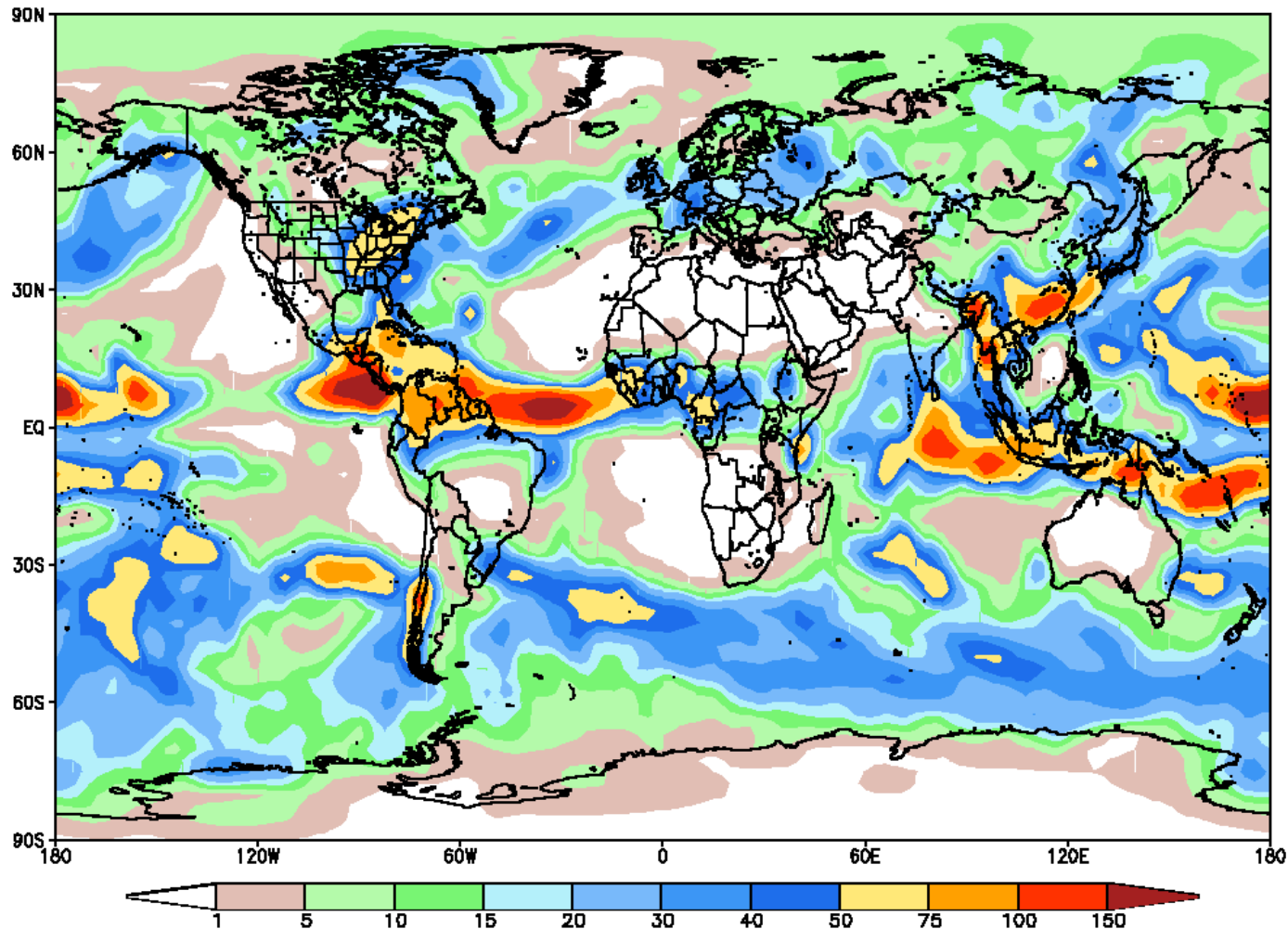
Rainfall across the Bay of Bengal, southeast Asia and the western Pacific Ocean south of Japan.



Global Forecast System (GFS) Week 2

Precipitation Forecast

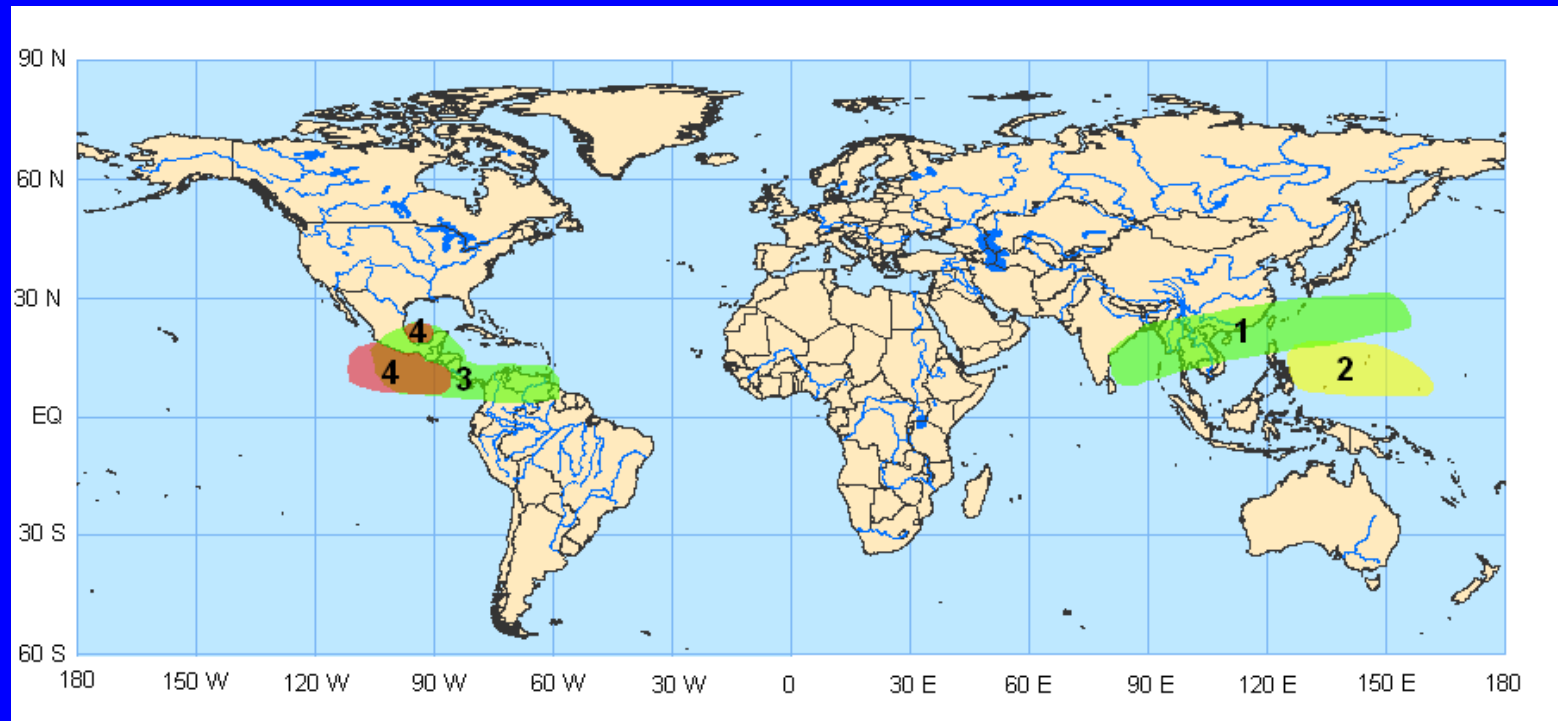
GFS 100 km Week 2 Total Precipitation (mm)
Issued Jun 5 2006 00Z for the period ending at Jun 18 2006 00Z





Potential Benefits/Hazards – Week 1

Valid June 6 – June 12, 2006

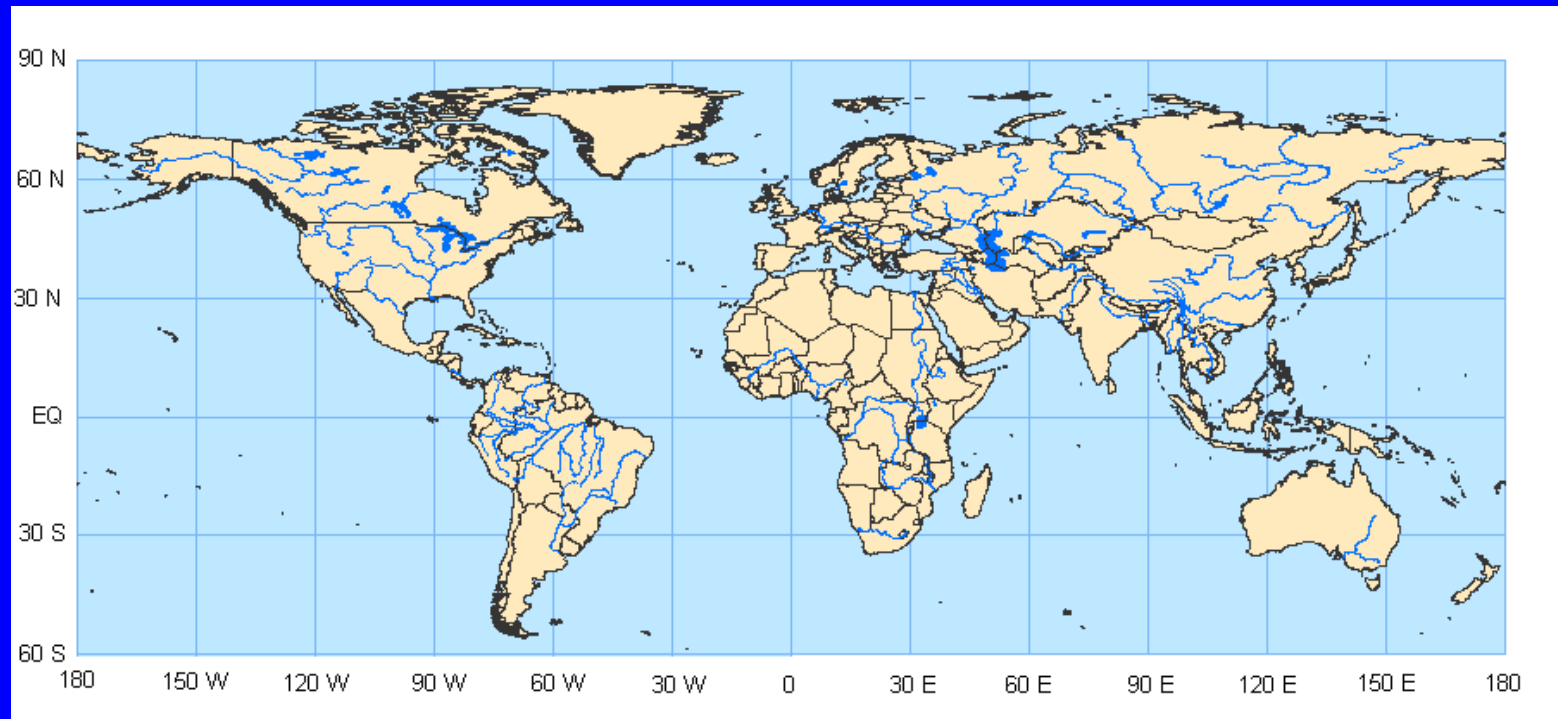


1. Increased chances of above normal rainfall extending from the Bay of Bengal across Southeast Asia to the far western Pacific Ocean south of Japan
2. Conditions remain unfavorable for tropical cyclone activity in the western Pacific Ocean
3. Increase chances of above normal rainfall across sections of the east Pacific Ocean, southern Mexico, Central America, and northern South America
4. Favorable conditions exist for tropical cyclogenesis in the east Pacific Ocean and Bay of Campeche



Potential Benefits/Hazards – Week 2

Valid June 13 – June 19, 2006



No definitive impacts expected at this time



Summary

- The latest observations indicate a continued weak MJO.
- Based on the latest observations and model forecasts, the MJO is expected to remain weak during the next 1-2 weeks.
- Potential hazards during week 1 include an increased chance of above normal rainfall from the Bay of Bengal into the far western Pacific Ocean as well as the east Pacific Ocean, southern Mexico, Central America and northern South America. Conditions are favorable for tropical cyclone activity in the east Pacific Ocean and Bay of Campeche (most likely late week 1). Areas in the western Pacific Ocean, however, will benefit from the continuation of unfavorable conditions for tropical cyclone activity.
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